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What is claimed is:

- 1 1. A nitrogen-containing copolymer comprising units derived from
2 (A) from about 5% to about 75% by weight of alkyl acrylate ester
3 monomers containing from 1 to 11 carbon atoms in the alkyl group;
4 (B) from about 25% to about 95% by weight of alkyl acrylate ester
5 monomers containing from 12 to about 24 carbon atoms in the alkyl group;
6 and
7 (C) from about 0.1% to about 20% by weight of at least one nitrogen
8 containing monomer selected from the group consisting of vinyl substituted
9 nitrogen heterocyclic monomers, N,N-dialkylaminoalkyl acrylate monomers,
10 N,N-dialkylaminoalkyl acrylamide monomers and tertiary-alkyl acrylamides,
11 provided that the total equals 100%.
- 1 2. The copolymer of claim 1 comprising units derived from about 30% to
2 about 60% by weight of monomer (A), from about 40% to about 70% by
3 weight of monomer (B) and from about 0.5% to about 5% by weight of
4 monomer (C).
- 1 3. The copolymer of claim 1 wherein monomer (A) comprises at least 5% by
2 weight of alkyl acrylate esters having from 4 to 11 carbon atoms in the alkyl
3 group.

- 1 4. The copolymer of claim 1 wherein monomer (A) comprises from about
2 10% to about 40% by weight of alkyl acrylate esters having from 1 to 4
3 carbon atoms in the alkyl group.
- 1 5. The copolymer of claim 1 wherein monomer (A) comprises from about
2 60% to about 90% by weight of alkyl acrylate esters having from 9 to 11
3 carbon atoms in the alkyl group.
- 1 6. The copolymer of claim 1 wherein the nitrogen containing monomer is an
2 N-vinyl substituted heterocyclic monomer.
- 1 7. The copolymer of claim 6 wherein the N-vinyl substituted heterocyclic
2 monomer is at least one member of the group consisting of N-vinyl imidazole,
3 N-vinyl pyrrolidinone and N-vinyl caprolactam.
- 1 8. The copolymer of claim 1 wherein the vinyl substituted heterocyclic
2 monomer is a vinyl pyridine.
- 1 9. The copolymer of claim 1 wherein the nitrogen containing monomer is a
2 N,N-dialkylaminoalkyl acrylamide or acrylate wherein each alkyl or
3 aminoalkyl group contains, independently, from 1 to about 8 carbon atoms.
- 1 10. The copolymer of claim 1 wherein the nitrogen containing monomer is
2 tertiary butyl acrylamide.

1 11. An additive concentrate comprising the copolymer of claim 1 and a
2 diluent.

1 12. The additive concentrate of claim 11 wherein the diluent displays
2 Brookfield viscosities measured by procedure ASTM D-2983 ranging from
3 about 50 to about 400 centipoise at -26°C and from about 100 to about 1500
4 centipoise at -40°C.

1 13. The additive concentrate of claim 11 wherein the diluent is a mineral oil.

1 14. The additive concentrate of claim 13 wherein the mineral oil consists
2 essentially of hydrotreated naphthenic oil.

1 15. The additive concentrate of claim 11 wherein the diluent is a synthetic
2 oil.

1 16. The additive concentrate of claim 15 wherein the synthetic oil is an
2 ester, a polyalphaolefin oligomer or an alkylated benzene.

1 17. The additive concentrate of claim 11 comprising from about 25% to
2 about 90% by weight of copolymer and from about 10% to about 75% by
3 weight of diluent.

1 18. The additive concentrate of claim 17 comprising from about 35% to
2 about 80% by weight of copolymer and from about 20% to about 65% by
3 weight of diluent.

1 19. The copolymer of claim 1 wherein (C) the nitrogen containing
2 monomer is grafted onto an alkyl acrylate copolymer containing units derived
3 from

4 (A) from about 5% to about 75% by weight of alkyl acrylate ester
5 monomers containing from 1 to 11 carbon atoms in the alkyl group and

6 (B) from about 25% to about 95% by weight of alkyl acrylate ester
7 monomers containing from 12 to about 24 carbon atoms in the alkyl group.

1 20. The copolymer of claim 1 wherein (C) the nitrogen containing
2 monomer is incorporated as a comonomer in an alkyl acrylate polymer.

1 21. The copolymer of claim 19 wherein monomer (A) comprises at least
2 5% by weight of alkyl acrylate esters containing from 4 to 11 carbon atoms in
3 the alkyl group.

1 22. The copolymer of claim 1 having a number average molecular weight
2 ranging from about 10,000 to about 300,000.

1 23. The copolymer of claim 22 wherein the number average molecular
2 weight ranges from about 30,000 to about 100,000.

1 24. The copolymer of claim 22 having polydispersity values ranging from
2 about 1.5 to about 5.

1 25. The copolymer of claim 1 wherein the alkyl acrylate ester monomers
2 comprise alkyl methacrylate esters.

1 26. A process for preparing a nitrogen containing copolymer comprising
2 reacting in the presence of a free radical initiator

3 (A) from about 5% to about 75% by weight of alkyl acrylate ester
4 monomers containing from 1 to 11 carbon atoms in the alkyl group,

5 (B) from about 25% to about 95% by weight of alkyl acrylate ester
6 monomers containing from 12 to about 24 carbon atoms in the alkyl group;
7 and

8 (C) from about 0.1% to about 20% by weight of at least one nitrogen
9 containing monomer selected from the group consisting of vinyl substituted
10 nitrogen heterocyclic monomers, N,N-dialkylaminoalkyl acrylate monomers,
11 N,N-dialkylaminoalkyl acrylamide monomers and tertiary alkyl acrylamides,
12 provided that the total equals 100%, and optionally, in the presence of a chain
13 transfer agent.

1 27. The process of claim 26 wherein monomer (A) comprises at least 5%
2 by weight of alkyl acrylate esters containing from 4 to 11 carbon atoms in the
3 alkyl group.

1 28. The process of claim 26 conducted in an extruder.

1 29. The process of claim 28 wherein the reaction is conducted in the
2 absence of any diluent.

1 30. The process of claim 26 wherein the reaction takes place in a diluent.
2

1 31. The process of claim 30 wherein the diluent is a mineral oil selected
2 from the group consisting of paraffinic and naphthenic oils.

1 32. A process comprising grafting onto a polyacrylate copolymer
2 comprising from (A) about 5% to about 75% by weight of units derived from
3 alkyl acrylate ester monomers containing from 1 to 11 carbon atoms and from
4 (B) about 25% to about 95% by weight of units derived from alkyl acrylate
5 ester monomers containing from 12 to about 24 carbon atoms, from about
6 0.1% to about 20% by weight, based on polyacrylate copolymer, of (C) a
7 nitrogen containing monomer selected from the group consisting of vinyl
8 substituted nitrogen heterocyclic monomers, N,N-dialkylaminoalkyl acrylate
9 monomers, N,N-dialkylaminoalkyl acrylamide monomers and tertiary alkyl
10 acrylamides, provided that the total is 100%, said grafting conducted in the
11 presence of a free radical initiator.

1 33. The process of claim 32 wherein monomer (A) comprises at least 5%
2 by weight of alkyl acrylate esters containing from 4 to 11 carbon atoms in the
3 alkyl group.

1 34. The process of claim 32 conducted in an extruder.

1 35. The process of claim 34 wherein the reacting is conducted in the
2 absence of any solvent.

1 36. The process of claim 32 wherein the reacting takes place in an organic
2 diluent.

1 37. The process of claim 36 wherein the organic solvent is selected from
2 the group consisting of paraffinic and naphthenic oils.

1 38. The process of claim 34 wherein the polyacrylate backbone is one
2 prepared in the presence of an organic diluent.

1 39. The process of claim 32 wherein the preparation of the polyacrylate
2 backbone and the subsequent grafting are each conducted in an extruder.

1 40. The nitrogen-containing copolymer prepared by the process of claim
2 26.

1 41. The nitrogen-containing copolymer prepared by the process of claim
2 32.

1 42. A lubricating oil composition comprising a major amount of an oil of
2 lubricating viscosity and a minor amount of the nitrogen-containing copolymer
3 of claim 1.

1 43. A lubricating oil composition comprising a major amount of an oil of
2 lubricating viscosity and a minor amount of the nitrogen-containing copolymer
3 of claim 40.

1 44. A lubricating oil composition comprising a major amount of an oil of
2 lubricating viscosity and a minor amount of the nitrogen-containing copolymer
3 of claim 41.

- 1 45. The lubricating oil composition of claim 42 wherein the oil of
- 2 lubricating viscosity comprises a mixture of mineral oil and synthetic oils.